

Claims

[c1]

1.A connector which comprises:

- (a) a polymeric tube having two ends and an essentially centrally disposed hole therethrough;
- (b) a pair of oppositely facing connectors at each end of said tube,
 - (i) each connector having an end, a sealing surface adjacent said end, and a shoulder adjacent said sealing surface, and
 - (ii) an internally threaded outwardly-facing nut, said nut having an essentially centrally disposed aperture, a diameter of said aperture dimensioned for sliding movement about said tube yet smaller than a diameter of said shoulder of said connector, said nut having an internal bore dimensioned to permit movement over said shoulder of said connector, said nut positioned internal of said shoulder of each connector; and
- (c) at least one third connector on said tube internal of said two oppositely facing connectors at each end of said tube and said outwardly-facing nuts, said at least one third connector further comprising
 - (i) a third connector end, a third sealing surface adjacent said third end, and a third shoulder adjacent said third sealing surface, and
 - (ii) a third internally threaded nut for said third connector, said third nut facing toward said third sealing surface, said third nut having an essentially centrally disposed third aperture, a diameter of said third aperture dimensioned for sliding movement about said tube yet smaller than a diameter of said third shoulder, said third nut having a third internal bore dimensioned to permit movement over said third shoulder, said third nut positioned adjacent to said third shoulder.

[c2]

2.The connector of claim 1 wherein

- (a) said two oppositely facing connectors and said at least one third connector have essentially identical sealing surfaces.

[c3]

3.The connector of claim 1 wherein

- (a) at least one sealing surface of said two oppositely facing connectors

and said at least one third connector is a different geometry.

[c4] 4.The connector of claim 1 wherein
(a)said connector has at least three different sealing surfaces.

[c5] 5.The connector of claim 1 wherein
(a)said tube and said connectors are selected from the group consisting of polyolefins, polycarbonates, polyesters, polyesters, polyurethanes, polyalkylene terephthalates, polysulfones, polyimides, polyphenylene ethers, styrenic polymers, polycarbonates, acrylic polymers, polyamides, polyacetals, halide containing polymers, copolymers thereof and blends thereof.

[c6] 6.The connector of claim 5 wherein
(a)said tube is braided.

[c7] 7.The connector of claim 1 wherein
(a)said at least one third connector is at least two oppositely facing connectors internal of said two connectors at each end of said tube and said outwardly facing nuts, each of said at least two oppositely facing connectors further comprising:
(i)an outwardly-facing end, an outwardly-facing sealing surface adjacent said ends, and a shoulder adjacent said outwardly-facing sealing surface, and
(ii)an outwardly-facing internally threaded nut, said nut having an essentially centrally disposed aperture, a diameter of said aperture dimensioned for sliding movement about said tube yet smaller than a diameter of said shoulder, said nut having an internal bore dimensioned to permit movement over said shoulder, said nut positioned adjacent to said shoulder.

[c8] 8.The connector of claim 7 wherein
(a)said two oppositely facing connectors and said at least two oppositely facing internal connectors have essentially identical sealing surfaces.

[c9] 9.The connector of claim 7 wherein

(a)at least one sealing surface of said two oppositely facing connectors and said at least two oppositely facing internal connectors is a different geometry.

[c10] 10.The connector of claim 7 wherein

(a)said connector has at least three different sealing surfaces.

[c11] 11.The connector of claim 7 wherein

(a)said tube and said connectors are selected from the group consisting of polyolefins, polycarbonates, polyesters, polyesters, polyurethanes, polyalkylene terephthalates, polysulfones, polyimides, polyphenylene ethers, styrenic polymers, polycarbonates, acrylic polymers, polyamides, polyacetals, halide containing polymers, copolymers thereof and blends thereof.

[c12] 12.The connector of claim 11 wherein

(a)said tube is braided.

[c13] 13.The connector of claim 1 wherein

(a)said at least one third connector is at least is at least three connectors internal of said two connectors at each end of said tube and said outwardly facing nuts, each of said at least three connectors further comprising :

(i)an outwardly-facing end, an outwardly-facing sealing surface adjacent said ends, and a shoulder adjacent said outwardly-facing sealing surface, and

(ii)an outwardly-facing internally threaded nut, said nut having an essentially centrally disposed aperture, a diameter of said aperture dimensioned for sliding movement about said tube yet smaller than a diameter of said shoulder, said nut having an internal bore dimensioned to permit movement over said shoulder, said nut positioned adjacent to said shoulder.

[c14]

14.The connector of claim 13 wherein

(a)said two oppositely facing connectors and said at least three internal

connectors have essentially identical sealing surfaces.

[c15] 15.The connector of claim 13 wherein

(a)at least one sealing surface of said two oppositely facing connectors and said at least three internal connectors is a different geometry.

[c16] 16.The connector of claim 13 wherein

(a)said connector has at least three different sealing surfaces.

[c17] 17.The connector of claim 13 wherein

(a)said tube and said connectors are selected from the group consisting of polyolefins, polycarbonates, polyesters, polyurethanes, polyalkylene terephthalates, polysulfones, polyimides, polyphenylene ethers, styrenic polymers, polycarbonates, acrylic polymers, polyamides, polyacetals, halide containing polymers, copolymers thereof and blends thereof.

[c18] 18.The connector of claim 17 wherein

(a)said tube is braided.

[c19] 19.The connector of claim 1 wherein

(a)said at least one third connector is at least is at least four connectors internal of said two connectors at each end of said tube and said outwardly facing nuts, each of said at least four connectors further comprising :

(i)an outwardly-facing end, an outwardly-facing sealing surface adjacent said ends, and a shoulder adjacent said outwardly-facing sealing surface, and

(ii)an outwardly-facing internally threaded nut, said nut having an essentially centrally disposed aperture, a diameter of said aperture dimensioned for sliding movement about said tube yet smaller than a diameter of said shoulder, said nut having an internal bore dimensioned to permit movement over said shoulder, said nut positioned adjacent to said shoulder.

[c20] 20.The connector of claim 19 wherein

(a)said two oppositely facing connectors and said at least four internal connectors have essentially identical sealing surfaces.

[c21] 21.The connector of claim 19 wherein

(a)at least one sealing surface of said two oppositely facing connectors and said at least four internal connectors is a different geometry.

[c22] 22.The connector of claim 19 wherein

(a)said connector has at least three different sealing surfaces.

[c23] 23.The connector of claim 19 wherein

(a)said tube and said connectors are selected from the group consisting of polyolefins, polycarbonates, polyesters, polyesters, polyurethanes, polyalkylene terephthalates, polysulfones, polyimides, polyphenylene ethers, styrenic polymers, polycarbonates, acrylic polymers, polyamides, polyacetals, halide containing polymers, copolymers thereof and blends thereof.

[c24] 24.The connector of claim 23 wherein

(a)said tube is braided.

[c25] 25.The connector of claim 1 wherein

(a)said at least one third connector is at least is at least five connectors internal of said two connectors at each end of said tube and said outwardly facing nuts, each of said at least five connectors further comprising :

(i)an outwardly-facing end, an outwardly-facing sealing surface adjacent said ends, and a shoulder adjacent said outwardly-facing sealing surface, and

(ii)an outwardly-facing internally threaded nut, said nut having an essentially centrally disposed aperture, a diameter of said aperture dimensioned for sliding movement about said tube yet smaller than a diameter of said shoulder, said nut having an internal bore dimensioned to permit movement over said shoulder, said nut positioned adjacent to said shoulder.

- [c26] 26.The connector of claim 25 wherein
(a)said two oppositely facing connectors and said at least five internal connectors have essentially identical sealing surfaces.
- [c27] 27.The connector of claim 25 wherein
(a)at least one sealing surface of said two oppositely facing connectors and said at least five internal connectors is a different geometry.
- [c28] 28.The connector of claim 25 wherein
(a)said connector has at least three different sealing surfaces.
- [c29] 29.The connector of claim 25 wherein
(a)said tube and said connectors are selected from the group consisting of polyolefins, polycarbonates, polyesters, polyesters, polyurethanes, polyalkylene terephthalates, polysulfones, polyimides, polyphenylene ethers, styrenic polymers, polycarbonates, acrylic polymers, polyamides, polyacetals, halide containing polymers, copolymers thereof and blends thereof.
- [c30] 30.The connector of claim 29 wherein
(a)said tube is braided.
- [c31] 31.The connector of claim 1 wherein
(a)said at least one third connector is at least is at least six connectors internal of said two connectors at each end of said tube and said outwardly facing nuts, each of said at least six connectors further comprising :
(i)an outwardly-facing end, an outwardly-facing sealing surface adjacent said ends, and a shoulder adjacent said outwardly-facing sealing surface, and
(ii)an outwardly-facing internally threaded nut, said nut having an essentially centrally disposed aperture, a diameter of said aperture dimensioned for sliding movement about said tube yet smaller than a diameter of said shoulder, said nut having an internal bore dimensioned to permit movement over said shoulder, said nut

positioned adjacent to said shoulder.

[c32] 32.The connector of claim 31 wherein

(a)said two oppositely facing connectors and said at least six internal connectors have essentially identical sealing surfaces.

[c33] 33.The connector of claim 31 wherein

(a)at least one sealing surface of said two oppositely facing connectors and said at least six internal connectors is a different geometry.

[c34] 34.The connector of claim 31 wherein

(a)said connector has at least three different sealing surfaces.

[c35] 35.The connector of claim 31 wherein

(a)said tube and said connectors are selected from the group consisting of polyolefins, polycarbonates, polyesters, polyesters, polyurethanes, polyalkylene terephthalates, polysulfones, polyimides, polyphenylene ethers, styrenic polymers, polycarbonates, acrylic polymers, polyamides, polyacetals, halide containing polymers, copolymers thereof and blends thereof.

[c36] 36.The connector of claim 35 wherein

(a)said tube is braided.

[c37] 37.A connector which comprises:

(a) a hollow polymeric tube having two ends;
(b) a pair of oppositely facing connector means at each end of said tube, each connector means having an associated fastening means; and
(c) at least one third connector means on said tube internal of said pair of oppositely facing connector means at each end of said tube and said associated fastening means, said at least one third connector means having an associated fastening means.

[c38]

38.The connector of claim 37 wherein

(a)at least one of said pair of oppositely facing connector means and at least one of said third connector means further comprises

(i)an end, a sealing surface adjacent said end, and a shoulder adjacent said sealing surface.

[c39] 39.The connector of claim 38 wherein
(a)both of said pair of oppositely facing connector means and at least one of said at least one third connector means further comprises
(i)an end, a sealing surface adjacent said end, and a shoulder adjacent said sealing surface.

[c40] 40.The connector of claim 39 wherein
(a)both of said pair of oppositely facing connector means and at least two of said at least one third connector means further comprises
(i)an end, a sealing surface adjacent said end, and a shoulder adjacent said sealing surface.

[c41] 41.The connector of claim 40 wherein
(a)both of said pair of oppositely facing connector means and at least three of said at least one third connector means further comprises
(i)an end, a sealing surface adjacent said end, and a shoulder adjacent said sealing surface.

[c42] 42.The connector of claim 41 wherein
(a)both of said pair of oppositely facing connector means and at least four of said at least one third connector means further comprises
(i)an end, a sealing surface adjacent said end, and a shoulder adjacent said sealing surface.

[c43] 43.The connector of claim 39 wherein
(a)at least one of said sealing surfaces is of a different geometry from said other sealing surfaces.

[c44] 44.The connector of claim 43 wherein
(a)said different sealing surface is said sealing surface of said at least one third connector means.

[c45] 45.The connector of claim 40 wherein

(a)at least two of said sealing surfaces is of a different geometry from said other sealing surfaces.

[c46] 46.The connector of claim 45 wherein
(a)said different sealing surfaces are said sealing surfaces of said at least two of said at least one third connector means.

[c47] 47.The connector of claim 45 wherein
(a)at least three of said sealing surfaces is of a different geometry from said other sealing surfaces.

[c48] 48.The connector of claim 47 wherein
(a)said different sealing surfaces are said surfaces of said at least two of said at least one third connector means.

[c49] 49.The connector of claim 41 wherein
(a)at least two of said sealing surfaces is of a different geometry from said other sealing surfaces.

[c50] 50.The connector of claim 49 wherein
(a)said different sealing surfaces are said sealing surfaces of said at least three of said at least one third connector means.

[c51] 51.The connector of claim 49 wherein
(a)at least three of said sealing surfaces is of a different geometry from said other sealing surfaces.

[c52] 52.The connector of claim 51 wherein
(a)said different sealing surfaces are said surfaces of said at least two of said at least one third connector means.

[c53] 53.The connector of claim 42 wherein
(a)at least two of said sealing surfaces is of a different geometry from said other sealing surfaces.

[c54] 54.The connector of claim 53 wherein
(a)said different sealing surfaces are said sealing surfaces of said at least

four of said at least one third connector means.

[c55] 55.The connector of claim 53 wherein
(a)at least three of said sealing surfaces is of a different geometry from said other sealing surfaces.

[c56] 56.The connector of claim 55 wherein
(a)said different sealing surfaces are said surfaces of said at least two of said at least one third connector means.

[c57] 57.The connector of claim 37 wherein
(a)at least one of said pair of oppositely facing connector means at each end of said tube further comprises
(i)an internally threaded connector means.

[c58] 58.The connector of claim 37 wherein
(a)at least one of said pair of oppositely facing connector means at each end of said tube further comprises
(i)an externally threaded connector means.

[c59] 59.A process for making a connector comprising the steps of:
(a)compression molding at least one first connector means having a first sealing surface on one end of a hollow tube; and
(b)injection overmolding at least one second connector means having a second sealing surface on a non-end portion of said tube.

[c60] 60.The process of claim 59 which further comprises the step of
(a)inserting at least one fastening means before the step of injection overmolding.

[c61] 61.A process for making a connector comprising the steps of:
(a)compression molding two oppositely-facing connectors means at each end of a hollow tube, each having an outwardly facing sealing surface; and
(b)injection overmolding at least one third connector means having a third sealing surface on a non-end portion of said tube.

- [c62] 62.The process of claim 61 which further comprises the step of
(a)inserting more than one fastening means prior to the step of
compression molding said second connector.
- [c63] 63.A process of making a connector comprising the steps of
(a)injection overmolding at least three connector means onto a hollow
tube, each connector means having a sealing surface, at least one of said
sealing surfaces being different in geometry, at least one pair of said
sealing faces being oppositely facing.
- [c64] 64.The process of claim 63 which further comprises the step of
(a)inserting more than one fastening means prior to the step of injection
molding said second connector means.
- [c65] 65.A process for making a connector comprising the steps of
(a)injection overmolding at least three connector means onto a hollow
tube, at least one of said connector means having an outwardly facing
sealing surface and at least one of said connector means having an
internally threaded fastening means.
- [c66] 66.The process of claim 65 which further comprises the step of
(a)inserting at least one fastening means onto said tube.
- [c67] 67.A process for making a connector comprising the steps of
(a)injection overmolding at least three connector means onto a hollow
tube, at least one of said connector means having an outwardly facing
sealing surface and at least one of said connector means having an
externally threaded fastening means.
- [c68] 68.The process of claim 67 which further comprises the step of
(a)inserting at least one fastening means onto said tube.